Attachment B

The Work Plan and Changes to the Work Plan

Residential Confirmation Cleaning Study

Work Plan

Prepared for and by:

The United States Environmental Protection Agency
2890 Woodbridge Avenue
Edison, New Jersey 08837

May 30, 2002

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) has been tasked to evaluate the effectiveness of various cleaning procedures that may have been utilized in cleaning residential living spaces located in the immediate vicinity of ground zero that are contaminated with dust and debris from the World Trade Center (WTC) attack. The study will involve implementing various vacuuming and cleaning techniques in separate apartments to determine their effectiveness. Comprehensive sampling for Contaminants of Potential Concern (COPC) will be conducted throughout the study to determine which method of cleaning is most effective at dust control. The building located at 110 Liberty Street has been selected for the study. The location of the building in relation to ground zero is shown on Figure 1.0.

1.1 BACKGROUND INFORMATION

The building at 110 Liberty Street is five stories with twelve (12) residential and six commercial spaces and has been unoccupied since September 11, 2001. It is owned by Liberty Street Associates LLC (David M. Baldwin Realty Company, Inc). The building is situated between Liberty and Cedar Steets and has a co-address of 113-117 Cedar Street. The collapse of the WTC severly impacted all spaces in the building with deposition of dust and debris. Windows of residential and commercial spaces facing the WTC were blown out as were the sky lights located in the ceilings of the three, fifth floor dwellings. The building was professionally cleaned shortly after the collapse of the WTC. The cleanup was limited to all residential spaces, the basement and the roof. None of the commercial spaces, except for unit 3A were cleaned. Two of the commercial spaces (Unit 1 and Unit 2) are presently covered with inches of dust. All of the residential rental spaces contain dust of various degrees due to redeposition of dust generated from the work effort at ground zero.

The rental spaces range in size from 1,000 to 1,300 square feet. The residential spaces are of open design and include a kitchen, bathroom and sleeping area. Commercial spaces identified as Unit 1, Unit 2 and Dwelling 3A were used as a chiropractors office, a retail mattress showroom and offices of Baldwin Realty, respectively. Each space is heated by an individual hot water base board system. Window or roof mounted air conditioners are present in the residential space, central systems are present in the commercial space (Unit 1 and Unit 2). Rental spaces are accessible from Liberty or Cedar Streets through common hallways, floors are accessible via an elevator and stairs. The building is presently without electricity and service is not expected to be restored until mid June. Each floor has a trash compactor room and a utility room. A laundry room is located on the second floor. The basement contains the building trash compactor, elevator shaft, electric meter rooms, preparation and storage areas for the Chinese restaurant, and a hair salon.

The study will be conducted on twelve (12) residential and three commercial spaces. The two restaurants and hair salon are not part of the study but will be cleaned by EPA at the completion of the study.

2. PROPOSED PLANS AND PROJECT OBJECTIVES

EPA will evaluate eight cleaning techniques during the study. Fifteen (15) separate units will be identified and evaluated based on the following criteria: exposure to ground zero, type of interior decorating and the location of the unit in the building. Cleaning techniques will be specific to each unit and will consist of basic vacuuming with standard household equipment to use of advanced commercial quality equipment. Wet wiping of horizontal surfaces will be performed in each unit. The use of wet vacuums for cleaning carpets will also be investigated. Comprehensive sampling for COPC will be conducted prior to, during and after the cleanup. Laboratory data will be evaluated by EPA to determine the efficiency and effectiveness of each cleanup technique as well as possible exposures to individuals performing the task.

The Cleanup Plan details the tasks and procedures to be used during the cleaning of specific units. Tasks will be identified and protocols will be detailed for building assessments, setup of support/decontamination zones, vacuuming/washing and disposal.

The Sampling and Analysis Plan (SAP) presents the detailed procedures and methods for sampling and analysis of bulk, surface and airborne dusts. Sampling will be performed during all phases of the cleanup. A Quality Assurance Project Plan (QAPP) is included in the Sampling and Analysis Plan to ensure that the sampling and analysis are conducted in conformance with EPA Quality Assurance/Quality Control (QA/QC) objectives.

The Health and Safety Plan (HASP) provides the minimum safety requirements that will be implemented during the activities conducted under the Cleanup and Sampling Plans. The Health and Safety Plan satisfies the requirements of 29 CFR 1910.120.

3. CLEANUP PLAN

This Cleanup Plan describes the procedures and protocols to be implemented for the following tasks:

i) support areas, security
ii) building and apartment access and assessment;
iii) photo documentation, and inventories of existing conditions;
iv) cleaning of common areas, building exteriors, elevator shafts and heating systems;
v) decontamination areas;
vi) procedures for interior cleaning;
vii) procedures for containment and disposal of cleanup wastes.

The sampling program to be implemented is summarized in Section 4. Specific details of sampling activities/protocols/methods performed during the Cleanup are presented in the Sampling and Analysis Plan and associated QAPP. All activities performed under the Cleanup Plan will be performed in accordance with the health and safety protocols presented in the Health and Safety Plan.

1. Support Facilities:

This project will require office space large enough to support numerous activities including public relations, public availability, technical support, communications, data collection and presentation, contractor support and EPA management. Portable trailers cannot be used in the area due to space constraints, therefore office space in the immediate vicinity of the cleanup will be rented for the duration of the study. Security needs will be determined for support areas and the study building.

2. Building Access and Assessment:

Prior to entering the building, EPA will obtain a signed access agreement with the building owner(s) and prior tenant(s). These documents will be prepared by EPA attorneys and signed copies will be kept on file. Once access is obtained the entire building and each apartment will be inspected for safety concerns including: gas/oil/water leaks, perishable foods, rodent/insect infestations, individual or common heating/cooling systems, damaged floors/walls/roofs, common areas, stair ways and elevators. All safety concerns will be noted/evaluated and repaired (if necessary) prior to beginning the cleanup.

3. Photo Documentation and Inventories:

Photo documentation of all building interiors will be conducted and catalogued in an index. The building owner and tenant will be requested to accompany EPA during this event. Inventories of personnel belongings will be developed and owners will be permitted to remove valuables. This documentation is for the benefit of all parties involved. Measurements of the apartment and details of the interior decorating (furniture/carpets etc.) will be obtained to develop a floor plan of the living space. The floor plan will be utilized to locate and document sample locations while the cleanup is progressing. Bulk samples of dust will be obtained (if possible) for laboratory analysis and subsequent evaluation.

4. Cleaning of Common Areas:

EPA will clean building exterior areas (if necessary) prior to beginning interior work. The work will be performed by a subcontractor utilizing vacuum trucks equipped with HEPA filtration. All foyers, stair ways, hall ways, elevators/shafts, and common heating systems will be vacuumed using commercial quality HEPA-filtered vacuums. Cleaning of common areas will begin at the building entrance and proceed to the upper level then return down to the entrance. Plastic curtains will be installed at the interface of clean and non - clean areas to prevent re - deposition of dust due to drafting. If HVAC systems are present, subcontractors specializing in cleaning these units may be utilized. All ventilation ducts will be covered with plastic to minimize recontamination with dust. Wet washing of walls, and ceilings will be performed if dust cannot be removed by vacuuming. The goal of this activity is to provide a dust free area to allow level “D” entry through the common spaces and for construction of equipment storage and decontamination areas. Decontamination areas be will temporary structures built of wood and plastic sheeting to be utilized to don and doff protective equipment when entering or exiting the work areas.

5. Interior Cleaning:

EPA will evaluate eight cleaning techniques on fifteen (15) rental spaces. Each cleaning technique will be tested on two rental units. The eight cleanup techniques will vary through use of different vacuuming systems. Sampling of dust before, during, and after the cleanup will be performed to evaluate the effectiveness of each cleanup technique and worker exposure.

General cleaning procedures which will be employed for all units are as follows: Bulk accumulations of dust and debris (if present) will be manually removed using shovels and commercial quality HEPA-filtered vacuums. All horizontal and vertical surfaces will be vacuumed beginning with the ceilings and working down along the walls to the floor. Windows, electrical outlets, sills, heating/cooling units will be vacuumed as they are encountered. Filters will be replaced on cooling units. After cleaning, A/C units will be sealed with plastic sheeting. Central HVAC intake/discharge registers will be covered with plastic. Horizontal and vertical solid surfaces including floors, appliances, table tops, cabinets (interior/exterior) as well as flat ware, and accent items will be washed with soap and water (if appropriate). Books, files, magazine, porous accent items will be vacuumed and stored in boxes then covered with plastic bags. Items such as clothes, shoes, drapes/curtains, will be HEPA vacuumed (if necessary) and stored in plastic bags for washing/dry-cleaning by the tenant. Carpets and furniture will be dry vacuumed until visibly clean. The tenant will be invited to monitor the cleanup if desired. EPA will furnish protective equipment to tenant(s) during the cleanup. No items will be discarded unless authorized by the tenant. If necessary, work schedules will be modified to accommodate the tenant.

Detailed cleaning procedures and sequencing of work are included as Attachment A.

Four scenarios have been developed to evaluate eight cleanup techniques. Each scenario contains two parts for testing two different cleaning procedures. Each scenario is discussed below:

Scenario 1:
(Selection Criteria): Accumulation of dust on horizontal surfaces should be limited to a dusting. This scenario may represent a typical apartment which was impacted but not totally encompassed in dust.

Test A (Equipment Selection) Cleaning will be conducted in two units using basic residential quality upright vacuums and shop vacuums which are available from Hoover®, Eureka®, Rigid® and Craftsman®.

Test B (Equipment Selection) Cleaning will be conducted in two units with basic vacuums as used in Test A but with the addition of an air filtration device (AFD). The AFD produces a negative pressure differential which will serve to capture dust particles through HEPA filtration that become airborne as a result of the cleaning activities.

Scenario 2:
(Selection Criteria) Same or similar to Scenario 1.

Test A (Equipment Selection) Cleaning will be conducted in two units using HEPA-filtered upright vacuums and HEPA-filtered shop vacuums which are available from Hoover®, Eureka®, Rigid® and Craftsman® companies. The upright vacuums from Hoover® and Eureka® were provided to residents of lower Manhattan, by FEMA and the American Red Cross for cleaning of their occupied space.

Test B (Equipment Selection) Cleaning will be conducted in two units using the same vacuums in Test A but with the addition of an AFD.

Scenario 3:
(Selection Criteria): Same or similar to Scenario 1.

Test A (Equipment Selection) Cleaning will be conducted in two units using commercial quality HEPA-filtered vacuums. These vacuums will be purchased from Nilfisk-Advance™ Vacuum Systems. Vacuums of this type were used by management companies for cleaning residential/commercial spaces in lower Manhattan after the WTC attack.

Test B (Equipment Selection) Cleaning will be conducted in two units using the same vacuums in Test A but with the addition of a AFD.

Scenario 4:
(Selection Criteria) Units have a direct exposure to ground zero. Windows were blown out as a result of the WTC collapse. Accumulation of dust on horizontal surfaces measures in inches. This scenario represents a severely impacted space with heavy accumulations of dust and debris. The two commercial spaces (Units 1 and Unit 2) in the building fit this criteria. Both spaces have wall to wall carpeting and acoustical ceiling tiles.

Test A (Equipment Selection) Cleaning will be conducted in both units using Nilfisk™ HEPA-filtered vacuums. Debris that cannot be vacuumed will be manually removed and disposed of. Due to the excessive amount of dust, a minimum of two AFDs will be used to control airborne dust. Cleaning will continue until all visible dust has been removed.

Test B (Wet Wiping) Additional cleaning of wall surface areas will be conducted to remove any dust residues that may not have been removed by vacuuming. Wiping of the walls with a damp soapy cloth will be performed to remove residual dust that may have adhered to the walls from the force of the collapse.

Test C (Carpet Shampooing) Wall to wall carpeting in both units will be shampooed or steam cleaned using commercial duty equipment.

Scenarios 1, 2 and 3 will be each be tested on four units. Scenario 4 will be tested on the two commercial spaces. Additional evaluation of wet wiping methods will be conducted on the 15th (Dwelling) that has not been proposed for evaluation under the previously proposed scenarios.

Samples will be collected prior to, during and after cleanup in accordance with the SAP to determine the effectiveness of the cleaning. If sample results do not attain cleanup objectives for a specific scenario, the unit will be re-cleaned using the same equipment and re-sampled. If after a second cleaning the results are unsatisfactory the unit will be cleaned using a method proven successful.

6. Disposal of Waste Generated in Cleanup:

Dust/debris, used protective equipment, clogged vacuum filters, expendables and items discarded by the tenant will be double bagged in 6ml plastic bags and deposited in a roll off container placed out side the building. The roll off container will be transported off site when full and replaced with another roll-off container. Water used for hand washing and equipment washing will be disposed into the sanitary sewer.

4. PROJECT SAMPLING

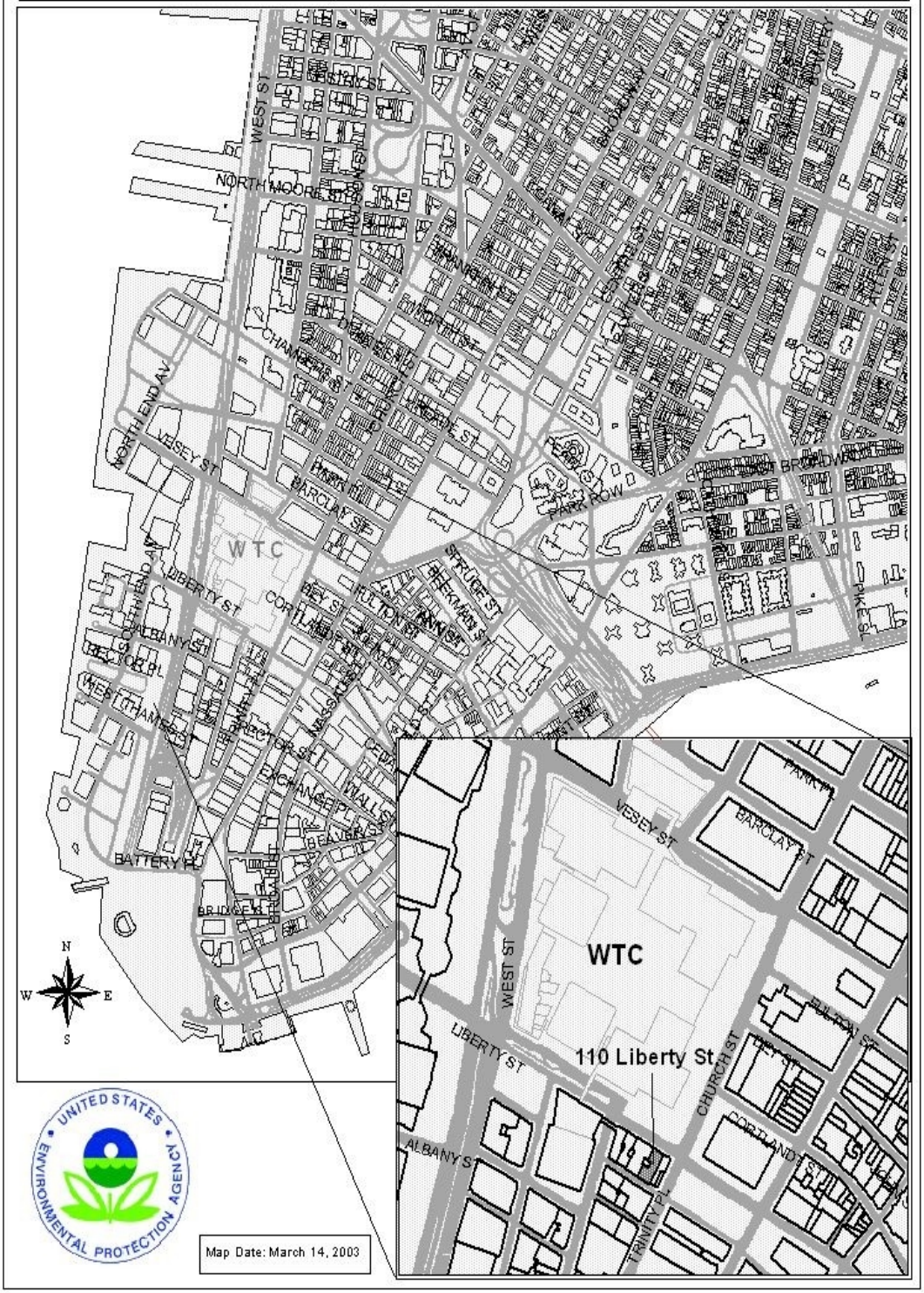
EPA will perform comprehensive sampling before, during and after the cleanup to evaluate the effectiveness of the work and possible worker exposure. Samples of dust collected by wipe, micro vac, and personnel pump sampling techniques will be obtained from porous and nonporous surfaces as well as from workers. Prior to the start of work, bulk samples will be collected (if possible) from each unit. If bulk samples cannot be collected, samples will be obtained using wipe or micro - vac techniques. Samples will be collected from the locations, and analyzed for the parameters shown on the tables included as Attachment B. Specific sampling protocols, methods as well as sample management, data validation and reporting are detailed in the SAP.

5. REPORT PREPARATION

Upon completion of the study a summary report will be prepared discussing the work performed under each scenario. The report will present a synopsis of the work, detailing conditions of the units prior to, during and after the cleanup, duration of the cleanup, problems encountered during cleanup and sampling, sample locations, laboratory data summary tables, and QA/QC documentation. This information will be presented to EPA for evaluation and recommendation.

Figure 1.0

Base Map of Lower Manhattan



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Map Date: March 14, 2003

Attachment A

Residential Confirmation Cleaning Study
Sequence of Activities and Detailed Cleaning Procedures

1. Obtain Access from Owner(s) & Tenants(s):
i. Meet with owner/tenants to explain the pilot and goals.
ii. Arrange for owner/tenants to enter rental space to identify items to be discarded or removed (clothes, rugs, furniture) This entry will be after hallways are cleaned and tenants are provided proper PPE.

2. Photo Documentation of Rental Space:
i. EPA will video and photograph all rental and common spaces before the cleanup begins. (drawers, cabinets, and closets will be opened and areas of damage will be noted)
ii Inventories of all belongings will be logged and entered into an EPA database.
iii Heating and air conditioning systems will be identified and photographed..
iv The interior space will be detailed on a scaled floor plan. Furniture, carpets, beds will be identified, sample locations will be marked.

3. Exterior Cleaning:
NYC is responsible for cleaning roof tops and building exteriors that are covered with dust. Dust will be removed by vacuum and wetted then brushed into bags.

4. Cleaning of Common Spaces:
EPA will initiate the cleanup by vacuuming all common spaces. This includes hallways, utility rooms, laundry rooms, compactor rooms, elevators and elevator shafts. Work will begin from the entrance to the top floors. Windows and screens will be cleaned first. Vacuuming will begin at the ceiling and continue down the walls to the floor. Work will continue to the next floor via stair ways. Utility rooms, compactor rooms and laundry rooms, will be vacuumed as encountered starting from the ceiling working down to the floor. Appliances will be moved to permit complete cleaning. Dryer vents and filters will be replaced or cleaned. When the top hallway is completed vacuuming will continue floor by floor to the building entrance following the same procedures as during the initial cleaning. Isolation barriers will be installed at the stairwell of each floor to minimized recontamination caused by drafting. This barrier will also isolate the common spaces for clearance sampling. Following receipt of acceptable clearance sample results, the floor of the common spaces (hallway) will be covered with construction paper (red rosin), and will be used as storage areas for equipment and supplies, and as passage areas for (level D) workers and visitors.

5. Cleaning of Interior (Residential) Spaces:
EPA will begin cleaning interior spaces beginning at the entrance door of the rental space. Workers will vacuum the foyer areas and construct an isolation barrier to separate this area from the rest of the rental space. The contained foyer area will be considered a clean space for donning PPE. Exteriors of windows/screens will be cleaned first. Interior areas will be cleaned as encountered. Items identified by the tenant(s) for disposal will be consolidated and bagged. Personnel belongings (shoes, clothes, linens etc.) will be vacuumed then bagged for washing/cleaning by the tenant. Vacuuming will begin at the ceiling and continue down the

walls to the floor, working toward the far end of the rental space. Window sills, electrical outlets, mouldings, baseboard heating elements and horizontal surfaces will be vacuumed as encountered. Carpets will be vacuumed 2 times using an agitator bar after removal of gross dust.. Fabric covered furniture will be vacuumed 2 times using a stiff brush attachment after removal of gross dust. Fabric window dressings will be vacuumed 2 times. Window air conditioners will be vacuumed externally then dismantled to be vacuumed internally. Central HVAC intake/discharge registers (if present) will be removed/cleaned to permit interior duct cleaning then replaced and covered with plastic. Appliances such as refrigerators and stoves will be moved to vacuum dust from floor footprint area. Spoiled food (if present in the refrigerator) will be removed at this time. Refrigerator cooling tubes will brushed and vacuumed. Closet and dresser interiors will be vacuumed. Upon reaching the far end of the rental space vacuuming will continue by reversing the process detailed above. Vacuuming will continue to the entrance area. At this time horizontal surfaces will be wet wiped, solid floors will be moped, flatware and solid objects, will be washed. Flatware, solid objects (electrical equipment, exercise equipment, etc.) will be packaged in boxes and/or covered with plastic. Work will continue to the isolation barrier where all cleaning equipment will be vacuumed and/or washed for use on the next rental space..

6. Cleaning of Interior (Commercial) Spaces:
Two commercial spaces are present in the building, both are grossly contaminated with inches of dust and debris. Both spaces are carpeted and have central air conditioning systems with the exchanger located above tiled ceilings. Entrance to the spaces is via a hallway from Cedar Street and a stairwell from Liberty Street. The heavy accumulation of dust in these spaces requires special considerations. The units will be isolated from both entrance ways by plastic barriers. Vacuum motors and canisters will operate from outside the isolation area. Vacuuming will be accomplished by snaking hoses into the contaminated areas. This procedure will minimize entraining dust into the air. Due to the accumulation of dust, negative air machines will be utilized to manage air born dust. The front windows are presently covered with plywood. Plywood will be removed and window openings will be vacuumed to remove dust and residual debris. Upon completion, plywood and plastic will be installed until the building owner installs permanent windows. Following complete removal of accumulated dust, vacuums will be brought into the space and cleaning will proceed as detailed in the procedures for residential space.

7. Specialized Cleaning Procedures
a. Window Mounted Air Conditioners.
Vacuum exterior surfaces, remove from wall mount and relocate to isolated cleaning area. Cover A/C mount with plastic. Discard filters and open unit to expose interior mechanism. Vacuum cooling fins and interior surfaces. Replace filter, install in mount and cover interior vents with plastic.

b. Roof Mounted A/C
Units cannot be removed; therefore, cleaning will be performed with the unit in place. Remove and replace filters, vacuum interior, inspect exterior exchanger, replace all cleaned parts and cover interior vents with plastic.

c. Refrigerators

Inspect refrigerator, remove and dispose of spoiled food. Move appliance to isolated cleaning area, elevate and clean dust from cooling coils using vacuums and specialized brushes. Clean floor area where appliance was located.

d. Stoves

Move appliance from location, clean floor area. Vacuum storage drawer (if present) and open top of stove to vacuum. Remove exhaust fan light and filters, replace with new. Vacuum first foot of exhaust duct if present.

e. Dishwashers

Remove toe plate and vacuum dust from under appliance.

f. Bathroom Fans

Remove protective cover and wet wipe, remove fan/motor and vacuum. Vacuum first foot of exhaust duct.

g. Hydronic Finned Radiation

Remove protective covers to expose heat elements. Finns are to be vacuumed and brushed to remove dust.

h. Electronic Equipment

Equipment is to be moved to the isolated cleaning area where dust will be removed by blowing air into the cooling slats while vacuuming.

i. Non-perishable canned and bottled goods

These items are to be wet wiped and stored in boxes covered with plastic for the tenant.

j Carpets

Carpets will be vacuumed twice or until visibly clean. Carpets in the commercial space will be shampooed after vacuuming.

Attachment B

Changes to the Work Plan

Changes to the Work Plan

1. WET WIPING

1.1 Wet Wipe Using Windex® / Wet Wipe Using Water Only

The work plan initially called for use of soap and water to accomplish wet wiping. Windex® brand was used because it is a commonly used cleaner believed to be readily available in most people's homes. Further, it is non-damaging to most surfaces, from wood to fiberglass. Typically, this soap does not "over-suds." It provides an effective detergent-based protection of surfaces when combined with cold water. This was important, because hot water was not immediately available at the project site. During the project, EPA opted to also evaluate application of wet wipe using water only. Water only was used on the desktop in the Chiropractor's Office, in the bathroom of the Chiropractor's Office, and in the entire Barber Shop. Water only was also used on the vinyl tiles under the carpeted area in the Mattress Store.

1.2 Horizontal Wet Wipe Only / Horizontal and Vertical Wet Wipe

The majority of tests of cleaning methods were accomplished using horizontal wet wipe only, to assist in determination of whether vacuuming without wet wiping would result in acceptable cleaning. However, application of both horizontal and vertical wet wipe was tested in Units 3B and 3C.

Application of both horizontal and vertical wet wiping in Unit 3B was consistent with the procedures called for relative to testing of Scope A, Lower Manhattan Cleaning Procedures. (Attachment F).

Unit 3C was selected for additional tests of the use of both horizontal and vertical wet wiping. The unit was selected for the following reasons:

- The apartment was heavily impacted by WTC dust
- The apartment was fully furnished and contained many personal belongings, and
- he test of vacuuming method called for use of equipment without HEPA filter or AFD. Additionally, the resident had expressed the intention to return.

1.3 Use of Swiffer® Brand Cloths

EPA opted to evaluate use of Swiffer® brand cloths for application of wet wipe. Swiffer® brand cloths were utilized during the cleaning of residential unit 5D.

2. SCOPE A- LOWER MANHATTAN CLEANING PROCEDURES

See Attachment F.